

U.S. Department of Transportation: Dementia and Driving Ability

This project explores the driving behaviors of people with early-stage memory impairments by collecting objective driving data from these people through custom in-vehicle technology.

Lead Agency:

U.S. Department of Transportation
National Highway Traffic Safety Administration (NHTSA)

Agency Mission:

Save lives, prevent injuries and reduce economic costs due to road traffic crashes through education, research, safety standards and enforcement activity.

Principal Investigators:

David W. Eby, Ph.D., Research Associate Professor, Principal Investigator
Social and Behavioral Analysis Division
University of Michigan Transportation Research Institute
Director, Michigan Center for Advancing Safe Transportation throughout the Lifespan
2901 Baxter Rd., Ann Arbor, MI 48109-2150

David J. LeBlanc, Ph.D., Associate Research Scientist
Engineering Research Division
University of Michigan Transportation Research Institute
2901 Baxter Rd., Ann Arbor, MI 48109-2150

Lisa J. Molnar, M.H.S.A., Lead Research Associate
Social and Behavioral Analysis Division
University of Michigan Transportation Research Institute
Assistant Director, M-CASTL
2901 Baxter Rd., Ann Arbor, MI 48109-2150

Nina M. Silverstein, Ph.D. Professor and Program Director
Gerontology
College of Public and Community Service
University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125-3383

Geri Adler, Ph.D., Assistant Professor
Graduate College of Social Work
University of Houston

4800 Calhoun Rd.
Houston, TX 77004

Partner Agencies:

University of Michigan Transportation Research Institute
University of Massachusetts, Boston
University of Houston

General Description:

It is not unusual for a person who has been diagnosed with early-stage Alzheimer's or other dementia to continue to drive. While some studies indicate that those in the earliest stages of dementia may retain their driving skills, others document older drivers with dementia who continue to drive even after being involved in crashes and near-crashes. Thus, while many persons with early stage dementia drive, their ability to drive safely, particularly as the disease progresses, remains unclear.

Those who want to know whether a family member who has been diagnosed with a form of dementia should continue to drive often turn to professionals including physicians, eye care specialists and retirement community personnel for guidance. These professionals may base their opinions on the driver's self assessment, the opinion of family members, or on the basis of a formal assessment. However, professionals, family members, and the drivers themselves may be unaware of the extent of declines in driving skills.

Recent advances in technology make it possible to automatically collect detailed information about driving performance. This technology can be used to monitor the driving behavior of individuals diagnosed with early stage dementia to provide practitioners with a better sense of how to monitor these drivers' changing skills. Moreover, the validity of drivers' self-assessments and those of family members could be investigated using in-vehicle data.

The primary objective of this project is to evaluate the feasibility of using existing in-vehicle technology to monitor a set of potentially hazardous driving behaviors common in persons with early stage dementia.

Excellence: What makes this project exceptional?

Research has plainly shown that individuals with dementia drive more poorly than drivers without dementia. Studies have identified several driving problems associated with dementia, including getting lost while driving, even in familiar areas, vehicle speed control difficulties, particularly driving consistently below posted speed limits, failure to signal lane changes, failure to check blind spots before lane changes, failure to maintain lateral lane position, running stop signs, and failure to recognize and obey traffic signs and signals. None of this research, however, examined driving behaviors objectively under natural driving conditions. Some studies rely on the self-report of family members,

while others rely on the observations of an evaluator who rides with the person in their vehicle. Family member reports can be unreliable, the family member is not always with the driver with dementia, and people with dementia can improve their driving somewhat, if they know they are being evaluated. This study will be the first to collect objective driving measures in this population during a everyday driving.

Significance: How is this research relevant to older persons, populations and/or an aging society?

According to the Alzheimer's Association, there is a new case of Alzheimer's Disease diagnosed every 72 seconds. Alzheimer's and related dementias are quite common in the older adult population. With the first baby boomer reaching age 65 in 2011 and all baby boomer being age 65 or older by 2029, there will be many older adults with dementia who will have mobility needs that need to be met. This project is a critical first step in studying the driving behaviors of this group of people, so that more effective driving evaluators, family members, health professionals, and other will have objective information on the driving skills that are declining for people with early-stage dementia.

Effectiveness: What is the impact and/or application of this research to older persons?

This project is designed to help all people who work with older adults more aware of the how driving skills decline in people with dementia. By understanding how skills decline, more effective countermeasures can be developed to help maintain safe mobility for people with dementia. Ultimately, this research should help to identify those drivers who are no longer safe to drive while also allowing those who are safe drivers to continue driving even though they are experiencing memory impairments.

Innovativeness: Why is this research exciting or newsworthy?

This is the first project to use in-vehicle technology to objectively record the driving behaviors of people diagnosed with early-stage memory impairment (dementia). The project has other innovative features. First, the project developed a sensor-suite and computer system (collectively called a data-acquisition system, DAS) that can be installed in the person's own vehicle. This meant that the DAS needed to be versatile enough to handle the huge variation in vehicle designs. Second, the project needed to develop algorithms to convert the raw sensor data into measures of nearly 20 driving behaviors. While some of these algorithms had been developed in previous studies, this project required that new ones be developed. For example, one behavior that the researchers expected to find with the memory-impairment subjects was that subjects will get lost. Because this behavior is rare in non-memory-impaired people, the project had to develop a way to analyze global positioning system (GPS) data to yield trips where people got lost. Finally, the project had to develop a sophisticated subject recruitment system. The project needed to find people with a diagnosis of early-stage memory impairment, who have recently had their driving professionally evaluated and been cleared to drive; and who were willing to have the technology installed in their vehicle.